



Discovery 2010
Concept Study Report (CSR) Evaluation Plan

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Approval Signatures

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*Signed copy on file



Introduction

- The Discovery Program is a science-driven program aimed at characterizing and understanding the bodies that constitute our solar system (excluding Earth and Sun). Its larger purpose is to illuminate the origin, evolution, and current state of the solar system.
- The purpose of this evaluation plan is to define the ground rules, process, organization and schedule to be used in evaluating the Concept Study Reports (CSRs) for the 3 Missions that were selected for a Phase A study.



Evaluation Plan Overview

- The Science Office for Mission Assessments (SOMA) at Langley Research Center developed this Discovery CSR Evaluation Plan for NASA Headquarters. This plan focuses on the Evaluation of the Discovery Concept Study Reports (CSRs).
- This CSR Evaluation Plan has been cleared for public release by SMD, SOMA, and OGC.
- The Lead Program Scientist is responsible for validating all evaluation processes, responsibility assignments, assumptions and ground rules.



Background

- 3 Full Missions were selected for a Phase A study. The Concept Study Reports for the full missions are due March 19, 2012. \$3M was provided for each Phase A study.
 - Comet Hopper (CHopper)
 - Interior Exploration using Seismic Investigations, Geodesy and Heat Transport (InSight) formerly Geophysical Monitoring Station (GEMS)
 - Titan Mare Explorer (TiME)



Selected Missions

- **Comet Hopper (Chopper), Principal Investigator Jessica Sunshine, University of Maryland in College Park.** – CHopper would study cometary evolution by landing on a comet multiple times and observing its changes as it interacts with the sun. NASA's Goddard Space Flight Center (GSFC) in Greenbelt, MD, would manage the project.
- **Interior Exploration using Seismic Investigations, Geodesy and Heat Transport (InSight), Principal Investigator Bruce Banerdt, Jet Propulsion Laboratory (JPL), Pasadena, CA.** – InSight would study the structure and composition of the interior of Mars and advance understanding of the formation and evolution of terrestrial planets. NASA's JPL would manage the project.
- **Titan Mare Explorer (TiME), Principal Investigator Ellen Stofan, Proxemy Research Inc., Gaithersburg, MD.** – TiME would provide the first direct exploration of an ocean environment beyond Earth by landing in, and floating on, a large methane-ethane sea on Saturn's moon Titan. Johns Hopkins University's Applied Physics Laboratory (APL) in Laurel, MD, would manage the project.



Handling of Proprietary Data

- All Report Materials will be considered Proprietary.
- Only those individuals with a need to know will be allowed to view CSR materials.
- Each Evaluator (non Civil Servant) will sign a NASA Non-Disclosure Agreement (NDA) which must be on file at NRESS prior to any CSRs being distributed to that Evaluator.
 - Civil Servants (including IPAs) are not required to sign the NDA.
- All Report Materials will be numbered and controlled and a record will be maintained as to who has what materials.
- Evaluators will be briefed at a Kickoff meeting on how to handle the CSR material. They will be briefed that they are not allowed to discuss CSRs with anyone outside the Evaluation Panel ever. Evaluators will be briefed to not contact anyone outside of the Evaluation Panel to discuss CSRs or to gain insight on any CSR related matter without getting the Lead Program Scientist (Dr. Michael New) and/or the Technical Management and Cost (TMC) Lead's (Dr. Carlos Liceaga) express permission in advance of making the contact.

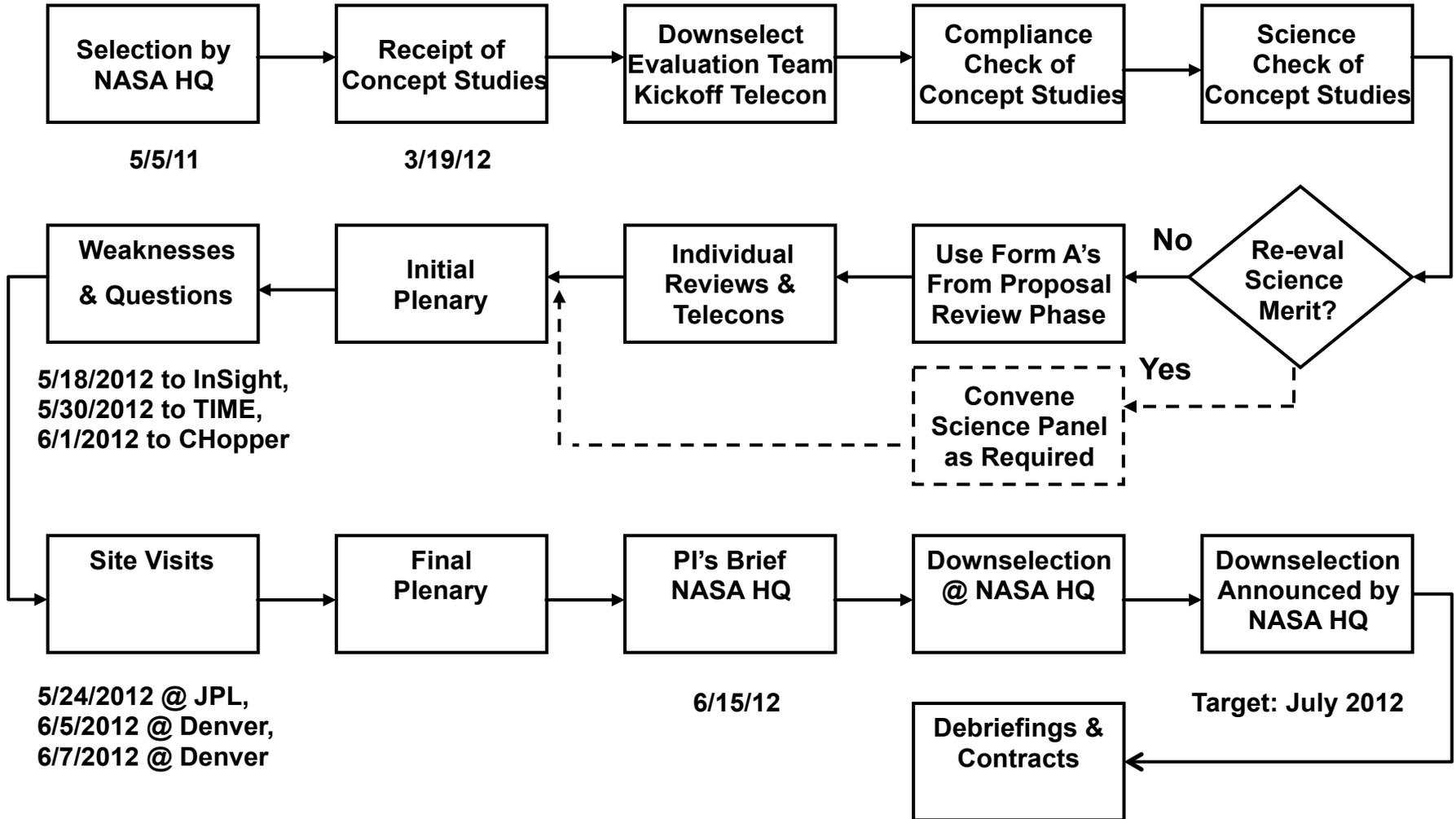


Handling of Proprietary Data

- During the Evaluation, all proprietary information that needs to be exchanged between Evaluators will be exchanged securely via the secure Remote Evaluation System (RES) web site maintained by NASA Langley, the secure Science Works System maintained by SMD, encrypted email, FedEx, fax, or regular mail. Proprietary information will not be sent via unencrypted email.
- Telecon line information is confidential. The phone numbers and pass codes are posted in a file on the Remote Evaluation Site (RES). Evaluators will be briefed to ensure they do not provide this information to anyone or distribute this information via email.
- When the evaluation process is complete, CSR materials will be collected from everyone. Some copies (for archival purposes) will be maintained in the NRESS and SOMA vaults. Also, some CSR material from the downselected mission will be provided to the Discovery Program Office at MSFC. All other CSR materials will be destroyed.



Discovery CSR Evaluation Flow





Conflict of Interest (COI)

- Evaluation panel members are cross checked against the list of organizations listed in the selected step one proposals to ensure no individual or organizational COI exists with the planned evaluators. Evaluators are asked to raise any potential COI.
- Any potential COI issue is discussed with the Lead Program Scientist and the AAA for SMD and documented in the attached Discovery Downselect COI Mitigation Plan.
- After the Concept Study Reports (CSRs) are received, all members of the evaluation panel will again be cross checked against the lists of personnel on each CSR and organizations mentioned in each CSR to ensure no individual or organizational COI exists on the list of Evaluators.
- In addition, all Evaluators will be asked to review the final list of conflicted organizations and asked to divulge whether they have any other financial, professional, or personal potential conflict of interest and whether they work for a profit making company that directly competes with any profit making proposing organization.
- All Civil Service evaluators (including IPAs) must file a Form OGE 450 or SF278 and be reviewed for conflicts of interest.
 - A list of all Civil Servants and IPAs involved in the evaluation will be provided to the AAA of SMD
- If any Evaluators with potential organizational COI must be utilized, their respective organizations must submit a plan, as required by their contract, addressing the Conflict of Interest and mitigation plan. This plan will outline how they will firewall the potentially conflicted Evaluator(s) during the evaluation process from the conflicted part of their organization.



Plan to Avoid Conflicts of Interest

- As potential conflicts of interest arise, they will be forwarded to the Lead Program Scientist and the AAA for SMD for resolution. The resolution of potential COI issues will be documented in an updated Discovery COI Mitigation Log.
- If during the evaluation there is any conflict of interest noted, the conflicted member (s) will be notified to stop reviewing CSRs immediately, and the Lead Program Scientist will be notified immediately. Steps will be expeditiously taken to remove any actual or potential bias imposed by the conflicted member(s).
- Community standards for conflicts of interest will be applied to all evaluators as directed in SMD Policy Document SPD-01A. Standards for financial conflicts of interest as specified in 18 USC 208 will be applied to civil servant evaluators. The HQ Office of General Counsel will be consulted as necessary. Conflicts involving contractors on the SOMA NASA Langley contract will require consultation with NASA Langley Procurement Office.



Evaluation Criteria and Selection Factors

- Evaluation Criterion for Concept Study: The approximate significance of each criteria is indicated by the percent weighting.
 - Scientific merit of the investigation (will not be reevaluated unless it is determined that the science has changed from that described in the proposal) (approximately 25%)
 - Scientific implementation merit and feasibility of the investigation (approximately 20%)
 - Feasibility of mission implementation, including cost risk, of the proposed investigation (approximately 50%)
 - Quality of plans for core E/PO, SDB sub-contracting, and for an optional Student Collaboration (SC), if proposed. (approximately 5%)
- Additional Selection factors
 - The PI-managed Mission cost
 - A variety of programmatic factors
 - NASA budget changes
 - Changes in scientific mandates, national priorities, and budgetary forecasts
 - Other programmatic factors



Evaluation Criteria Details

- The Criteria to Evaluate the Concept Study Reports is documented in the Criteria and Guidelines for the Phase A Study document.
- **Scientific Merit of the Investigation (Criterion A)** - The *Lead Discovery Program Scientist* will determine whether issues that may have emerged in the course of the concept study have effected significant changes to the science objectives or other aspects of the proposed Baseline and Threshold Science Missions (see Requirement CS-17 in Section II of the Guidelines and Criteria for the Phase A Study) in such a manner as to have impacted the basis for the evaluation of the scientific merit of the investigation as determined by the peer review panel for the Step 1 proposal. If there are no significant changes to the proposed investigation that undermine the basis of this rating, the peer review panel rating for scientific merit of the Step 1 proposal will be the rating for scientific merit of the CSR. If there are significant changes, the Program Scientist will convene a peer review panel to reevaluate the scientific merit of the objectives in light of these changes. The factors for reevaluating this criterion will be the same as those used for the Step 1 proposal review (Section 7.2.2 of the AO).



Evaluation Criteria Details

- **Scientific Implementation Merit and Feasibility of the Investigation (Criterion B)** - All of the factors defined in Section 7.2.3 of the AO apply to the CSR and will be re-evaluated from the data supplied in the CSR and at the site visit. The merit of scientific implementation will be based on the feasibility of the investigation's technical approach, instrumentation provided to acquire the data, plans for science operations and data acquisition, plans for science descope, technical capabilities of the investigation team, and the plans for data analysis and archiving.
- Note that additional subfactors (bolded) have been added to Factor B-2, Probability of technical success.
- Factor B-2: Probability of technical success. This factor includes the maturity and technical readiness of the instruments; the adequacy of the plan to develop the instruments within the proposed cost and schedule; the robustness of those plans, including recognition of risks and mitigation plans for retiring those risks; the likelihood of success in developing any new technology that represents an untested advance in the state of the art; the ability of the development team - both institutions and individuals - to successfully implement those plans; and the likelihood of success for both the development and the operation of the instruments within the mission design. **This factor includes assessment of technology readiness, heritage, environmental concerns, accommodation, and complexity of interfaces for the instrument design (*n.b.*, subfactor added for the evaluation of the CSR).**



Evaluation Criteria Details

- Factor A-3 of the AO will be re-evaluated as a factor for Scientific Implementation Merit and Feasibility; it has been renumbered as Factor B-7.
- Factor B-7: Likelihood of scientific success. This factor includes how well the anticipated measurements support the goals and objectives; the adequacy of the anticipated data to complete the investigation and meet the goals and objectives; and the appropriateness of the mission requirements for guiding development and ensuring scientific success.



Evaluation Criteria Details

- The following is a new evaluation factor that was not described in the AO and was not evaluated for Step 1 proposals. This will be evaluated in addition to the factors specified in AO Section 7.2.3 for the CSRs:
- Factor B-8: Maturity of proposed Level 1 science requirements and Level 2 project requirements. This factor includes assessment of whether the Level 1 requirements are mature enough to guide the achievement the objectives of the Baseline Science Mission and the Threshold Science Mission, and whether the Level 2 requirements are consistent with the Level 1 requirements. The CSR will be evaluated for whether the requirements are stated in unambiguous, objective, quantifiable, and verifiable terms that do not conflict. The CSR will be evaluated for the adequacy, sufficiency, and completeness of the Level 1 and Level 2 requirements, including their utility for evaluating the capability of the instruments and other systems to achieve the mission objectives. The stability of the Level 1 science requirements and Level 2 project requirements will be assessed including whether the requirements are ready, upon initiation of phase B, to be placed under configuration control with little or no expected modifications for the lifecycle of the mission.



Evaluation Criteria Details

- **Feasibility of the Mission Implementation, including Cost Risk, of the Proposed Investigation (Form C)** - All of the factors defined in Section 7.2.4 of the AO apply to the CSR. These may be augmented, as noted below, to assess whether technical, management, and cost feasibility are at least at a Phase A level of maturity.
 - Factor C-1: Adequacy and robustness of the instrument implementation plan. The maturity and technical readiness of the instrument complement will be assessed, as will the ability of the instruments to meet mission requirements. This factor includes an assessment of the instrument design, accommodation, interface, heritage, and technology readiness. This factor includes an assessment of the instrument hardware and software designs, heritage, and margins. This factor includes an assessment of the proposer's understanding of the processes, products, and activities required to accomplish development and integration of the instrument complement. This factor also includes adequacy of the plans for instrument systems engineering and for dealing with environmental concerns. This factor includes an assessment of plans for the development and use of new instrument technology and the adequacy of backup plans to mature systems within the proposed cost and schedule when technologies having a TRL less than 6 are proposed.



Evaluation Criteria Details

- **Feasibility of the Mission Implementation, including Cost Risk, of the Proposed Investigation (Form C) - (continued)**
 - Factor C-2: Adequacy and robustness of the mission design and plan for mission operations. This factor includes an assessment of the overall mission design and mission architecture, the spacecraft design and design margins (including margins for launch mass, delta-V, and propellant), the concept for mission operations (including communication, navigation/tracking/trajectory analysis, and ground systems – hardware and software – and facilities), and the plans for launch services. This factor includes an assessment of the scientific measurements planning and decision-making processes (including any priorities assigned to specific measurements and plans to update the measurement strategy based on early measurements), and the schedule and workforce allocated to these processes. This factor includes mission resiliency – the flexibility to recover from problems during both development and operations – including the technical resource reserves and margins, system and subsystem redundancy, and reductions and other changes that can be implemented without impact to the Baseline Science Mission.



Evaluation Criteria Details

- **Feasibility of the Mission Implementation, including Cost Risk, of the Proposed Investigation (Form C) - (continued)**
 - Factor C-3: Adequacy and robustness of the flight systems. This factor includes an assessment of the flight hardware and software designs, heritage, and margins. This factor includes an assessment of the proposer's understanding of the processes, products, and activities required to accomplish development and integration of all elements (flight systems, ground and data systems, etc.). This factor includes an assessment of the adequacy of the plans for spacecraft systems engineering, qualification, verification, mission assurance, launch operations, and entry/descent/landing. This factor includes the plans for the development and use of new technology and the adequacy of backup plans to ensure success of the mission when technologies having a TRL less than 6 are proposed. The maturity and technical readiness of the spacecraft, subsystems, and operations systems will be assessed. The adequacy of the plan to mature systems within the proposed cost and schedule, the robustness of those plans, including recognition of risks and mitigation plans for retiring those risks, and the likelihood of success in developing any new technologies will be assessed. NASA-developed technologies incentivized in the AO are not included in this factor except for their interface and use being within their specification.



Evaluation Criteria Details

- **Feasibility of the Mission Implementation, including Cost Risk, of the Proposed Investigation (Form C) - (continued)**
 - Factor C-4: Adequacy and robustness of the management approach and schedule, including the capability of the management team. This factor includes: the adequacy of the proposed organizational structure and Work Breakdown Structure (WBS); the management approach including project level systems engineering; the commitment, spaceflight experience, and relevant performance of the PI, PM, other named key management team members, and implementing organization, mission management team, and known partners against the needs of the investigation; the commitments of partners and contributors; and the team's understanding of the scope of work covering all elements of the mission, including contributions. The commitment, spaceflight experience, and prior experience of the key members of the PI-led investigation team and of the implementing institutions will be assessed against the needs of the investigation. This factor also includes assessment of CSR elements such as the relationship of the work to the project schedule, the project element interdependencies, the associated schedule margins, and an assessment of the likelihood of launching by the proposed launch date. Also evaluated under this factor are the proposed project and schedule management tools to be used on the project along with the subcontracting plan including small and small disadvantaged businesses.



Evaluation Criteria Details

- **Feasibility of the Mission Implementation, including Cost Risk, of the Proposed Investigation (Form C) - (continued)**
 - Factor C-5: Adequacy and robustness of the cost plan, including cost feasibility and cost risk. This factor includes CSR elements such as cost, cost risk, cost realism, and cost completeness including assessment of the basis of estimate, the adequacy of the approach, the methods and rationale used to develop the estimated cost, the discussion of cost risks, the allocation of cost reserves by phase, and the team's understanding of the scope of work (covering all elements of the mission, including contributions). CSRs will be evaluated for the adequacy of the cost reserves and whether CSRs with inadequate cost reserves demonstrate a thorough understanding of the cost risks. This factor also includes an assessment of the proposed cost relative to estimates generated using parametric models and analogies. Also evaluated under this factor are the proposed cost management tools to be used on the project.



Evaluation Criteria Details

- **Feasibility of the Mission Implementation, including Cost Risk, of the Proposed Investigation (Form C) - (continued)**

The following evaluation factor has been removed as a subset of Factor C-4 described in the AO and has been revised for the evaluation of the CSR.

- Factor C-6: Adequacy of the risk management plan. The adequacy of the proposed risk management approach will be assessed, as will any risk mitigation plans for new technologies, any long-lead items, and the adequacy and availability of any required manufacturing, test, or other facilities. The approach to any proposed descoping of mission capabilities will be assessed against the proposed Threshold Science Mission. The plans for managing the risk of contributed critical goods and services will be assessed, including the commitment of partners and contributors as documented in Letters of Commitment and the adequacy of contingency plans for coping with the failure of a proposed cooperative arrangement or contribution; when no mitigation is possible, this should be explicitly acknowledged. The stability and reliability of proposed partners, and the appropriateness of any proposed contribution, is not assessed as a management risk but will be assessed by SMD as a programmatic risk element of the investigation.



Evaluation Criteria Details

- **Feasibility of the Mission Implementation, including Cost Risk, of the Proposed Investigation (Form C) - (continued)**

The following are new evaluation factors that are not described in the AO and were not evaluated for Step 1 proposals. These will be evaluated for the CSRs in addition to the factors given in Section 7.2.4 of the AO and repeated above as Factors C-1 through C-6.

- Factor C-7: Ground Systems. This factor includes an assessment of the proposed mission operations plans, facilities, hardware and software, processes, and procedures.
- Factor C-8: Approach and feasibility for completing Phase-B. The completeness of Phase B plans and the adequacy of the Phase B approach will be assessed. This assessment will include evaluation of the activities/products, the organizations responsible for those activities/products, and the schedule to accomplish the activities/products.
- Factor C-9: Implementation feasibility and risk of any proposed use of NASA-developed technology. The proposed infusion of NASA-developed technology described in Section 5.9.3 of the AO will be assessed including whether the plan adequately interfaces with, integrates, and uses the NASA-developed technology.



Evaluation Criteria Details

- **Quality of Plans for Education and Public Outreach (E/PO) (Form D)**
 - Quality of Plans for Core E/PO Program. This factor will be evaluated against the criteria described in the document *Explanatory Guide to SMD E/PO Evaluation Factors, Version 3.1 (November 2010)*, which can be found in the *Discovery Program Library*. A discussion of these criteria is included in that document. See Section I in Part II of *Discovery Guidelines and Criteria for the Phase A Concept Study* document for further details on E/PO requirements.



Evaluation Criteria Details

- **Overall Merit of Student Collaboration (SC) (if proposed) (Form E)**
 - This factor will include an assessment of whether the scope of the SC follows the guidelines in Section 5.5.3 of the AO. The criteria to be used to evaluate the SC component and a discussion of those criteria are described in the document *Explanatory Guide to the NASA Science Mission Directorate Educational Merit Evaluation Factors for Student Collaboration Elements, Version 1.1 (September 2007)*, which can be found in the Discovery Program Library.



Evaluation Criteria Details

- **Merit of the Small Business Subcontracting Plans (Form F)**
 - This factor will be evaluated on the participation goals and quality and level of work performed by small business concerns overall, as well as that performed by the various categories of small business concerns listed in FAR 52.219-9, except for Small Disadvantaged Businesses (SDBs). Offerors will separately identify, and will be evaluated on participation targets of SDBs in North American Industry Classification System (NAICS) codes determined by the Department of Commerce to be underrepresented industry sectors.



CSR Evaluation Panel Products

- Form A (if necessary)
 - Grade range: Excellent, Excellent/Very Good, Very Good, Very Good/Good, Good, Good/Fair, Fair, Fair/Poor, Poor
- Form B For all CSRs
 - Grade range: Excellent, Excellent/Very Good, Very Good, Very Good/Good, Good, Good/Fair, Fair, Fair/Poor, Poor
- Form C For all CSRs
 - Grade range: Low Risk, Medium Risk, High Risk
 - Polling is held on 3 bins within each Risk category
 - The Risk Rating reflects the median grade.
- Form D For all CSRs
 - Grade range: Excellent, Excellent/Very Good, Very Good, Very Good/Good, Good, Good/Fair, Fair, Fair/Poor, Poor
- Form E - The merit of any Student Collaboration (SC) if proposed.
 - Is it separable from the main mission? (Yes/No)
 - Grade: Meritorious, Meritorious with Reservations, Not Meritorious.
- Form F For all CSRs -The merit of the Small Business Subcontracting Plans
 - Grade range: Acceptable or Needs Work



Grade Definitions - Forms A, B and D

- Form A, B, and D Grade Definitions
 - Excellent: A comprehensive, thorough, and compelling CSR of exceptional merit that fully responds to the objectives of the AO as documented by numerous and/or significant strengths and having no major weaknesses.
 - Very Good: A fully competent CSR of very high merit that fully responds to the objectives of the AO, whose strengths fully outbalance any weaknesses.
 - Good: A competent CSR that represents a credible response to the AO, having neither significant strengths nor weakness and/or whose strengths and weaknesses essentially balance.
 - Fair: A CSR that provides a nominal response to the AO, but whose weaknesses outweigh any perceived strengths.
 - Poor: A seriously flawed CSR having one or more major weaknesses (e.g., an inadequate or flawed plan of research, or lack of focus on the objectives of the AO).



Form B Evaluation Factors & Sub-Factors

The degree to which the CSR addressed the following factors directly relates to the Science Implementation Merit Grade of Excellent, Excellent/Very Good, Very Good, Very Good/Good, Good, Good/Fair, Fair, Fair/Poor, Poor

- **Instrument & Mission Design**
 - Degree to which the proposed mission will address the goals & objectives
 - Appropriateness of the selected instruments & mission design for addressing the goals & objectives
 - Degree to which the proposed instruments & mission can provide the necessary data, including details on data collection strategy & plans
 - Sufficiency of the data gathered to complete the scientific investigation
- **Probability of technical success**
 - Maturity & technical readiness of the instruments
 - Adequacy of the plan to develop the instruments within cost & schedule
 - Robustness of development plans, including recognition of risks & mitigation plans for retiring those risks
 - Likelihood of success in developing any new technology
 - Ability of the development team to successfully implement those plans
 - Likelihood of success of development & operation of the instruments within the mission design
 - Technology readiness, heritage, environmental concerns, accommodation, & complexity of interfaces for the instrument design
- **Data, cartography, sample analysis plan**
 - Planning & budget adequacy & evidence of plans for well-documented, usable, high-level data products, maps, & software
 - Adequacy of resources for physical interpretation of data
 - Planning for reporting scientific results in refereed journals
 - Planning for the timely release of data
- **Science Resiliency**
 - Approach to descoping
 - Operational ability to withstand adverse circumstances, to degrade gracefully, & the potential to recover from anomalies
- **Probability of science team success**
 - Experience, expertise, & organizational structure of the science team
 - Mission design in light of any proposed instruments
 - Co-Investigators make necessary contributions and have well defined and appropriate roles
- **Merit of any SEOs**
 - Appropriateness of SEO activities
 - Potential of the SEO activities to enlarge the science impact of the mission
 - Appropriate costing of the selected activities
 - Peer review panel will inform NASA of impact to overall Form B rating
- **Likelihood of scientific success**
 - How well the anticipated measurements support the goals & objectives
 - Adequacy of the anticipated data to complete the investigation & meet goals & objectives
 - Appropriateness of the mission requirements for guiding development & ensuring scientific success
- **Maturity of proposed requirements**
 - Adequacy, sufficiency, & completeness of the Level 1 & Level 2 requirements, including their utility for evaluating the capability of the instruments & other systems to achieve the mission objectives
 - Stability of the Level 1 science requirements & Level 2 project requirements including whether the requirements are ready to be placed under configuration control with little or no expected future modifications
 - Whether the requirements are stated in unambiguous, objective, quantifiable, & verifiable terms that do not conflict



Form D Factors and Sub-Factors as Applicable

The degree to which the CSR addressed the following factors directly relates to the Quality of Plans for Education and Public Outreach Grade of Excellent, Excellent/Very Good, Very Good, Very Good/Good, Good, Good/Fair, Fair, Fair/Poor, Poor

- **Intrinsic Merit**
 - Quality, scope, realism, and appropriateness
 - Connections to other NASA E/PO activities
 - Partnerships/Sustainability
 - Evaluation
- **Relevance to NASA's Objectives**
 - Customer needs focus
 - Content
- **Cost**
 - Resource utilization
- **Program Balance Factors**
 - Pipeline
 - Diversity



Grade Definitions - Form C

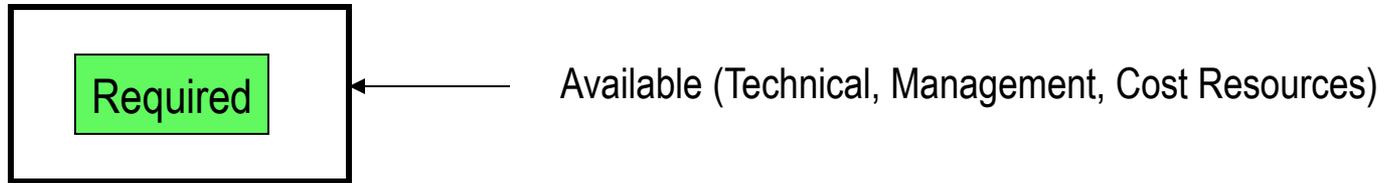
- The Criterion C evaluation is to determine, for each proposed investigation, the level of risk of implementing the investigation, as proposed, on time and within cost.
- The Criterion C Risk Ratings of **Low Risk, Medium Risk, and High Risk** will each be split into 3 categories for a total of 9 Risk Rating categories. In general:
 - **Low Risk:** There are no problems evident in the proposal that cannot be normally solved within the time and cost proposed. Problems are not of sufficient magnitude to doubt the Proposer's capability to accomplish the investigation well within the available resources. "Envelope adequate". (Low-Low Risk, Medium-Low Risk, or High-Low Risk)
 - **Medium Risk:** Problems have been identified, but are considered within the proposal team's capabilities to correct within available resources with good management and application of effective engineering resources. Mission design may be complex and resources tight. "Envelope tight". (Low-Medium Risk, Medium-Medium Risk, or High-Medium Risk).
 - **High Risk:** One or more problems are of sufficient magnitude and complexity as to be deemed unsolvable within the available resources. "Does not fit within the Envelope". (Low-High Risk, Medium-High Risk, or High-High Risk)
- **Envelope:** Resources available to handle known and unknown development problems that occur. Includes resource, schedule and funding reserves; descope options; and fallback plans.



Risk Envelope Concept

Envelope: All TMC Resources available to handle known and unknown development problems that occur. Includes schedule and funding reserves; reserves and margins on physical resources such as mass, power, and data; descope options; fallback plans; and personnel.

Low Risk: Required resources fit well within available resources.



Medium Risk: Required resources just barely inside available resources. Tight, but likely doable



High Risk: Required resources DO NOT fit inside available resources. Expect project to fail





Form C Factors and Sub-Factors

The degree to which the CSR addresses the following factors directly relates to the Form C grade

- **Instrument**
 - Maturity and technical readiness
 - Ability to meet mission requirements
 - Design, accommodation, interface, and heritage
 - Hardware and software designs and margins
 - Development and integration processes, products and activities
 - Instrument systems engineering
 - Environmental concerns
 - New technology and backup plans
- **Mission Design and Operations**
 - Spacecraft design and margins
 - Concept for mission operations
 - Launch services
 - Scientific measurements planning and decision-making processes
 - Mission resiliency
- **Flight Systems**
 - Hardware and software designs, heritage and margins
 - Development and integration processes, products and activities
 - Spacecraft systems engineering, qualification, verification, mission assurance, launch operations, and entry/descent/landing
 - New technology and backup plans
 - Maturity and technical readiness of the spacecraft, subsystems, and operations systems
- **Management and Schedule**
 - Organizational structure and WBS
 - Project level systems engineering
 - Commitment, education, spaceflight experience and past performance of key team members and implementing organizations, partners and contributors
 - Schedule interdependencies and margins
 - Project and schedule management tools
- **Cost**
 - Risk, realism and completeness
 - Basis of estimate (BOE)
 - Reserves by phase
 - Comparison with TMC estimates
- **Risk Management**
 - Recognition of risks and mitigation plans for retiring those risks
 - Descope plan and decision milestones
- **Ground Systems**
 - Operations plans, facilities, hardware and software, processes and procedures
- **Phase-B**
 - Activities and products, organizations and schedule
- **NASA-developed Technology**
 - Interfaces, integration and use within specification
- **Comments**
 - Planetary protection
 - International participation/ITAR
 - SC, is it separable from the main mission?



Cost Evaluation

- Full Missions will be evaluated using three cost models.
- Cost Realism will be reported as a Cost Risk in one of the following 5 categories: 1) Low Risk, 2) Medium-Low Risk, 3) Medium Risk, 4) Medium-High Risk, and 5) High Risk.
- The Evaluation of Cost Realism will be based on all CSR-provided cost data and the application of TMC Models and Analogies, and heritage.
- Cost threats, risks, and risk mitigation issues will be identified and analyzed.
- Draft Forms C and S will be completed on all CSR's prior to the Initial Plenary.
- Probability curves on the expected cost or "S curves" will not be provided or considered in the Cost Risk Analysis.
- During the TMC plenary, the entire panel will participate in Cost deliberations:
 - All information from the entire evaluation process will be considered in the final cost assessment.
 - All significant Cost Findings will be included on the Form C.

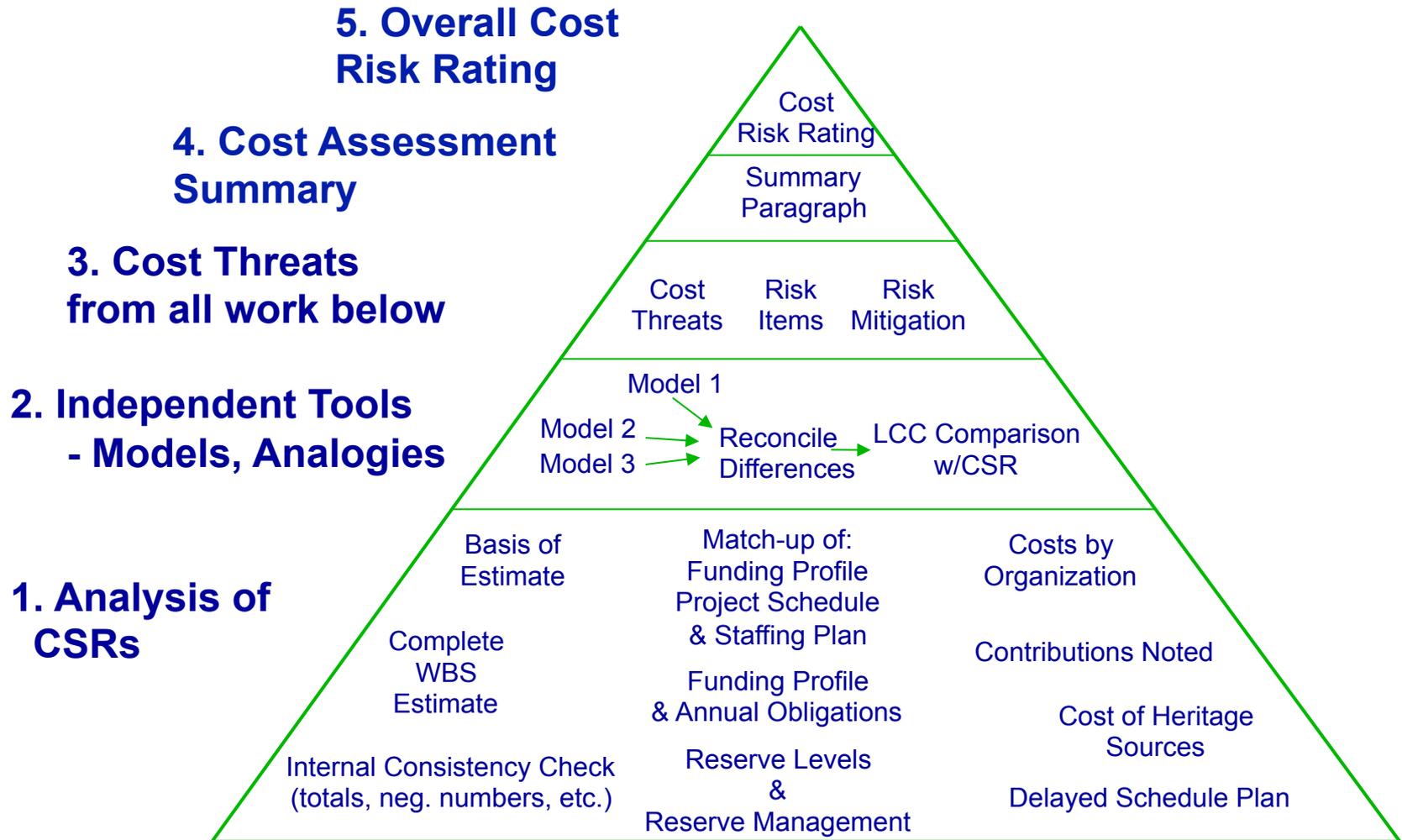


Cost Risk Definitions (Form S)

Cost Risk	Definition
LOW	<p><i>Cost Envelope is adequate – expect success.</i></p> <ul style="list-style-type: none"> - The proposer's estimate (<i>with reserves</i>) agrees closely with the work, staffing, and schedule proposed, fits within the program cap and any other budget constraints, and is verified by TMC independent analysis. - The proposed cost reserve is adequate to address cost threats identified by TMC, and to fund unexpected needs. - The resource management plan indicates strong, active management of resources throughout implementation.
MEDIUM-Low	<p><i>Cost Envelope is somewhat tight, but project should succeed.</i></p> <ul style="list-style-type: none"> - TMC identified one or more significant cost threats or weaknesses with regard to the proposer's estimate, cost reserves, and/or resource management. Overall impact of identified threats and weaknesses should be manageable. - TMC independent analysis verifies proposer's costs.
MEDIUM	<p><i>Cost Envelope is tight. Success requires diligent oversight of resources.</i></p> <ul style="list-style-type: none"> - TMC identified one or more significant cost threats or weaknesses with regard to the proposer's estimate, cost reserves, and/or resource management. Cost impact of threats may be underestimated by proposer. Overall impact of identified threats and weaknesses should be manageable. - TMC independent analysis verifies some or most of proposer's costs.
MEDIUM-High	<p><i>Cost Envelope is very tight. It is likely the project will require more funding.</i></p> <ul style="list-style-type: none"> - TMC identified one or more major cost threats or weaknesses with regard to the proposer's estimate, cost reserves, and/or resource management. Cost impact of threats appears underestimated by proposer. Overall impact of identified threats and weaknesses will be challenging to manage within funding and/or schedule constraints. - TMC independent analysis could not verify significant elements of proposer's costs.
HIGH	<p><i>Project exceeds the Cost Envelope and is expected to require substantially more funding.</i></p> <ul style="list-style-type: none"> - TMC identified one or more major cost threats or weaknesses in the proposer's estimate, cost reserves, and/or resource management. Overall impact of identified threats and weaknesses exceeds proposed resources and/or available resources to cover them. Threats are not acknowledged, or are underestimated by proposer. - TMC independent analysis could not verify proposer's costs.



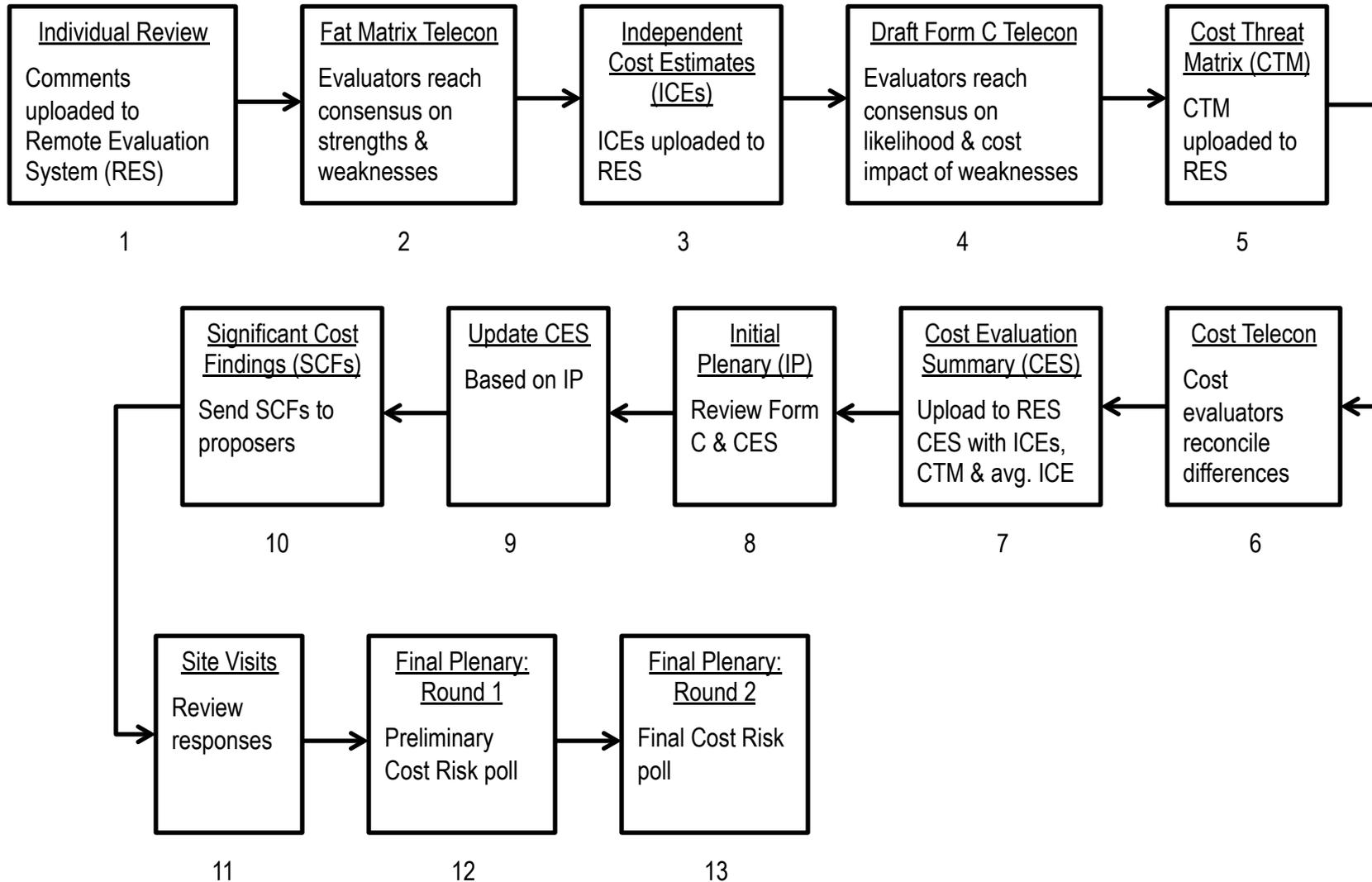
Cost Assessment Process and Elements





Discovery CSR Cost Evaluation Process

Discovery CSR Evaluation Plan





Downselect Cost Process

- A guiding principle for the TMC evaluation process is that individual reviews will occur first and individual evaluation comments will be entered into the Remote Evaluation System (RES) prior to multi evaluator discussions to the extent that this is feasible. This principle is being implemented as described below for cost related comments and products on the Discovery Downselect Evaluation.
1. Each Cost Analyst enters cost findings in the RES. Three cost evaluators read the CSRs and each used a different cost model to generate a preliminary Independent Cost Estimate (ICE) and a set of cost findings. The three cost evaluators, an instrument evaluator, and a spacecraft evaluator had a telecon to start reconciling differences and produce an updated preliminary version of ICEs and cost findings.
 2. Criterion C panel review of individual findings. The cost evaluators and all other Criterion C evaluators participated in a Fat Matrix Telecon (FMT). In this telecon all individual findings entered in the RES are discussed for all evaluation Criterion C Factors. The preliminary ICEs were not discussed during the FMT.
 3. Generate Version 1 of ICE based on Criterion C panel discussion. After the FMT, each of the three cost evaluators will generate an ICE based only on the assumptions and discussion from the FMT. The WBS elements in the ICEs will be rounded to the nearest \$1M. These three estimates will be presented at the Draft Form C telecon to all Criterion C evaluators. No changes to the ICEs (generated based on the FMT) will be made until after listening to discussions with all evaluators at the Draft Form C telecon.
 4. Three ICEs presented at Draft Form C Telecon. A Draft Form C telecon includes participation of all Criterion C evaluators where all major or minor strengths or weaknesses are discussed. The three Version 1 ICEs for each CSRs will be presented. The likelihood and cost impact, if any, of each weakness is discussed.
 5. Cost Threat Matrix. Subsequent to the Draft Form C telecon, a cost threat matrix is developed for each CSR that reflects the discussion of the Criterion C panel on the likelihood and impact of significant weaknesses. This is posted to the RES for all Criterion C evaluators to access.



Downselect Cost Process

Discovery CSR Evaluation Plan

6. Cost Telecon. A cost telecon among all three cost evaluators will occur after the Draft Form C telecon to reconcile differences in detailed assumptions that may affect the ICEs.
7. Update ICEs based on Draft Form C telecon. The cost analysts will update their ICE to reflect the Draft form C discussions and the cost threat matrix discussions.
8. Initial Plenary. An Initial Plenary with all evaluators is held and findings on Criterion C are reviewed. Also the Cost Evaluation Summary is reviewed which includes the cost threat matrix and the three ICEs for each CSR.
9. Plenary Cost Threat Matrix and ICE update. Based on the review by the entire Criterion C panel at the Initial Plenary, the cost threat matrix will be updated and the ICE will be updated by each cost analyst.
10. Cost Findings Sent to Proposer. Statements which represent the cost threat matrix will be included in the weaknesses sent to proposers prior to the site visit in order to provide the proposer an opportunity to respond at the site visit. Statements describing significant cost findings based on the ICE will be sent to the proposer prior to the site visit in order to provide the proposer an opportunity to respond at the site visit.
 - ICE related cost findings will be treated in a consistent manner across all CSRs.
 - If the average ICE results for any WBS element are outside the error range of the average ICE, the proposer will be sent a question or comment prior to the site visit stating that the proposers estimate for that WBS element could not be validated. The error range of the average ICE will be provided to the proposers.
 - Cost related findings which may substantiate a weakness will be sent to the proposer in advance of the site visit.
11. Site Visits. Cost Analysts will participate in the Site Visits and listen to responses to significant cost findings. All cost analysts will attend the post site visit meeting and participate in criterion C discussions. After the site visit and the post site visit meeting, all cost analysts will update the cost threat matrix and their ICE.
12. Round 1 Final Plenary. In Round 1, all major and minor strengths or weaknesses are discussed. The cost threat matrix and the average ICE are reviewed based on the site visit and post site visit meeting. A preliminary Cost Risk Poll is held at the end of Round 1. The cost threat matrix will be updated after Round 1 and the ICEs will be updated to reflect the Round 1 discussions and the updated cost threat matrix.



Downselect Cost Process

- 13. Round 2 Final Plenary. In Round 2, all major and minor strengths or weaknesses are discussed. The cost threat matrix and the consensus ICE are reviewed based on updates from Round 1. A Final Cost Risk Poll is held at the end of Round 2. The cost threat matrix will be updated after Round 2 and the ICE will be updated to reflect the Round 2 discussions and the updated cost threat matrix.
- The likelihood and cost impact, if any, of each weakness will be stated as “This finding represents a cost threat assessed to have a VERY LOW/LOW/MODERATE/HIGH/VERY HIGH likelihood of occurrence with a potential consequence of a MINIMUM/SMALL/MODERATE/SIGNIFICANT/VERY SIGNIFICANT cost impact.”
- Below is the Cost Threat Matrix Format Planned for use on the Discovery Downselect.

	Impact				
Percent of \$425M	2.35-7.06%	7.29-11.76%	12-16.47%	16.71-21.18%	21.41-25%
Likelihood	Minimum (\$10-30M)	Small (\$31-50M)	Moderate (\$51-70M)	Significant (\$71-90M)	Very Significant (≥\$91M)
Very High (≥ 90%)					
High (71-90%)					
Moderate (51-70%)					
Low (31-50%)					
Very Low (10-30%)					



Grade Definitions – Form E

Student Collaboration (SC)

Discovery CSR Evaluation Plan

- The merit of any Student Collaboration (SC) will be given a yes/no grade and one of three adjectives: Meritorious, Meritorious with Reservations, Not Meritorious
 - **Is it separable from the main mission?** (Yes/No)
 - **Meritorious:** The student collaboration proposed has achievable education goals and objectives and an implementation/oversight/management approach that will provide students with a rich hands-on education experience.
 - **Not Meritorious:** The student collaboration proposal has not articulated achievable education goals and objectives and/or the implementation/oversight/management approach limits the likelihood of success for student's opportunities for hands-on experience.



Form E (SC) Factors and Sub-Factors as Applicable

Generally, the degree to which the CSR addresses the following factors directly relates to the grade of Meritorious, Meritorious with Reservations, Not Meritorious

- **SC Implementation Merit**
 - Maturity of requirements
 - SC design
 - SC performance
 - SC operations and data acquisition
 - SC data analysis and archiving
 - SC team
- **SC technical, management, and cost feasibility**
 - Instrumentation
 - Mission design and operations
 - Spacecraft/flight systems
 - Management and schedule
 - Cost
- **Educational Merit**
 - Quality, Scope, Realism, and Appropriateness
 - Continuity
 - Evaluation
 - Diversity



Grade Definitions – Form F Small Business Subcontracting

- The merit of the Small Business Subcontracting Plans will be rated as either Acceptable or Needs Work
 - **Acceptable:** The subcontracting plan adequately addresses all required elements of a subcontracting plan, and the proposed subcontracting percentage goals and the quality level of the work to be performed by small business concerns is sufficient.
 - **Needs Work:** The subcontracting plan does not address all required elements of a subcontracting plan, or the proposed subcontracting percentage goals and quality of work to be performed by small businesses is not sufficient, and further participation must be negotiated if this mission is selected.



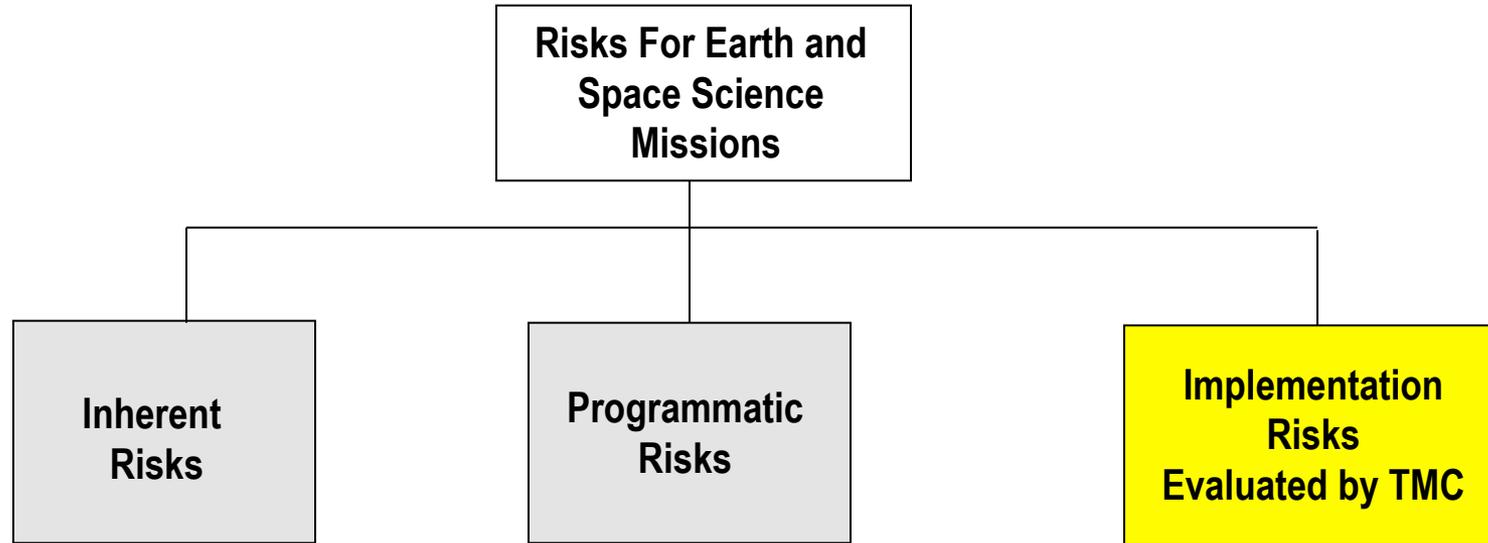
Form F Factors and Sub-Factors as Applicable

Generally, the degree to which the CSR addresses the following factors directly relates to the grade of Acceptable or Needs Work

- Participation goals and quality and level of work performed by:
 - Small business concerns overall
 - Various categories of small business concerns listed in FAR 52.219-9 except for Small Disadvantaged Businesses (SDBs)
- Participation targets of SDBs in North American Industry Classification System (NAICS) codes determined by the Department of Commerce to be underrepresented industry sectors



Earth and Space Science Mission Risks



Risks that are unavoidable to do the mission:

- Launch environments
- Space environments
- Mission durations

Risks that are uncertainties due to matters beyond project control:

- Environmental Assessment approvals
- Budgetary uncertainties
- Political impacts
- Late/non-delivery of NASA provided project elements
- Stability and reliability of proposed partners and their contributions

Risks that are associated with implementing the mission:

- Adequacy of planning
- Adequacy of management
- Adequacy of development approach
- Adequacy of schedule
- Adequacy of funding
- Adequacy of Risk Management (planning for the known and unknown)



Evaluation Ground Rules

- All CSRs will be reviewed to identical standards and without comparison to other CSRs.
- All evaluators will be experts in the area that they evaluate.
- Specialist Reviewers (to provide special technical expertise to the Criterion B/C/D/E/F Panel) and External/Mail-In Reviewers (to provide special science expertise to the Criterion B Panel) may be utilized, respectively, based on the specific technology and science that is proposed.



Criterion C Panel Evaluation Principles for Discovery Downselect

- Basic Assumption on first step: Study team is the expert on his/her concept study.
 - TMC: Task is to try to validate study team's assertion of Low Risk.
 - Study team: Task is to provide evidence that the project is Low Risk.
 - Proposer given the benefit of the doubt in step one.
- Selection (downselect) CSR Risk Assessment:
 - The task is the same, but expectations are higher.
 - The Criterion C Panel's task is to try to validate study team's assertion of Low Risk.
 - The study team's task is to provide evidence that the project is Low Risk.
 - The study team is NOT given the benefit of the doubt in the downselect.
- All CSRs will be reviewed to identical standards.
 - All CSRs receive same evaluation treatment in all areas.
- The Criterion C Panel is made up of evaluators that are experts in the areas of the CSRs that they evaluate.
- The Criterion C Panel develops findings for each CSR that reflect the general agreement of the entire panel.
 - Findings: As expected (no finding), above expectations (strengths), below expectations (weaknesses).



Definitions of the Findings

Major Strength: A facet of the response that is judged to be well above expectations and can substantially contribute to the ability to meet technical commitments on schedule and within cost.

Major Weakness: A deficiency or set of deficiencies taken together that are judged to substantially affect the ability to meet the proposed technical objectives within the proposed cost and schedule.

Minor Strength: A strength that is substantial enough to be worthy of note and brought to the attention of study team in debriefings.

Minor Weakness: A weakness that is substantial enough to be worthy of note and brought to the attention of study team in debriefings.

Note: Minor points can influence risk ratings (unlike step 1).

Note: Normally, “as expected” findings should not be noted. However, findings that confirm analyses or comments to the Study Team or Selecting Official should be entered as “as expected”.



Panel Processes

- All evaluation panel members review the assigned CSR and write an individual review before discussing findings with other members of the evaluation team.
- The NASA Langley Remote Evaluation System (RES) will be used for:
 - Entering individual evaluation team members comments for Criterion B and Criterion C comments.
 - Developing draft and final Form B and Form C for each CSR.
 - As a repository for all Final Forms for the evaluation (Form B, C, D, E, F).
- Evaluators may only participate in polling on CSRs that they have reviewed.
- Only evaluators that have participated in the Form C Initial Plenary, and the Form C Final Plenary may participate in polling on the Form C.
 - Participation is defined as in person or via telecon.
- The Form B will be reviewed during the first day and a half of each plenary and only Form B evaluators will be polled on the Form B. Instrument experts on Form C may also participate in the Form B evaluation and participate in polling on Form B if designated by the Lead Program Scientist as Form B evaluators.
- Only Form B evaluators that have participated in the Initial Plenary and the Final Plenary may participate in polling on the Form B.
 - Participation is defined as in person or via telecon.



Panel Processes

- Consistency Review for Form B findings and Form C findings.
 - Form C consistency
 - A Form C Consistency Group will review all Draft Form Cs and questions at the Initial Plenary and all Criterion C findings at the Final Plenary.
 - All Form C evaluators will review all CSRs. Exceptions are specialist reviewers.
 - Form B consistency
 - A NASA Form B Consistency Group will review all Draft Form Bs and questions at the Initial Plenary and all Criterion B findings at the Final Plenary.
 - Form B and Form C consistency
 - At least one Form B evaluator for each CSR will participate in the Form C discussions for each mission at the plenary meetings
 - Some Form C instrument experts will attend the Form B panel.
 - Consistency of findings between Form B and C will be reviewed at the final plenary and adjudicated.
- Weaknesses and Questions to study teams:
 - In rare circumstances, NASA may send weaknesses and ask questions of study teams up to 6 calendar days after the last site visit if necessary to resolve any issue or clear up a potential misunderstanding.



Initial Plenary

- The initial plenary is used to identify significant issues related to Criterion B and C based on the initial evaluation of the CSR. Draft Form B and Cs are reviewed.
- The Goal of the Initial Plenary is :
 1. Identify the Major Weakness, Minor Weaknesses, Major Strengths and Minor Strengths of each CSR.
 2. If necessary, questions will be developed in addition to the weaknesses to give the study team an opportunity to clarify any misunderstanding.
- The main topic areas are the implementation issues in Criterion B, Criterion C and Criterion D (E/PO) and Criterion E (Student Collaboration).
- No polling on grades occurs at the Initial Plenary (Criterion B and Criterion C)
- The significant Weaknesses and questions will be sent to the study team in advance of the site visit. Weaknesses and questions will be sent to each team 6 days prior to the site visit.
- Criterion D (E/PO) and E (Student Collaboration) is reviewed by a Criterion D and E panel prior to the Initial Plenary. Site visit E/PO and Student Collaboration questions are prepared and provided no later than the Initial Plenary to the Lead Program Scientist.



Weaknesses and Questions to Study Teams

- Significant Weaknesses (SWs) and Questions for the Study Team
 - All SWs will be sent to the study team in advance of the site visit
 - These weaknesses are preliminary and may change based on site visit information and further discussion by evaluation panels.
 - Questions may also be sent to the study team or verbalized during the site visit.
 - Questions must be of significance to a Form B, C, D, E rating.
- The Lead Program Scientist will approve all SWs and questions developed at the Initial Plenary. Two types of responses are planned for written SWs and questions:
 - Response required prior to site visit. Written SWs or questions provided to the Study team that must be addressed prior to the site visit. These are for SWs or questions that require data that must be reviewed prior to the site visit.
 - Response required at site visit. These are for written SWs or questions that must be addressed during the day of the site visit in the site visit presentation or by material provided during the site visit day.
- The evaluation team members at the site visit may ask follow up questions during the site visit to ensure they understand the response to a SW or question or clarify any significant issues.



Site Visits

- Site Visits with Oral Briefings will be used to clarify implementation details and commitments. The study team may address weaknesses identified in the concept study and provide updates on the concept study since submission of the Concept Study Report.
- Site Visits are InSight – May 24 at JPL, TIME – June 5 in Denver, CO, CHopper – June 7 in Denver, CO.
- Briefings at each Site Visit will be limited to 7 hours with 1 additional hour for a site tour. (Suggest a schedule of 8:00 a.m. – 5:30 p.m. including 1 hour lunch and two 15 minute breaks, one in the a.m. and one in the p.m.).
- All Site Visit presentations/briefings should be in a plenary session with all Evaluation Team members attending - no splinter sessions – unless authorized by Lead Program Scientist or Criterion C Chair.
- Written weaknesses & questions and/or requests for information will be submitted to the PI 6 days before the Site Visit. All teams will have the same lead time.
- All information relevant to the evaluation including information presented during the Site Visit, information provided in response to weaknesses and questions, and information contained in the CSR will be considered during the evaluation.

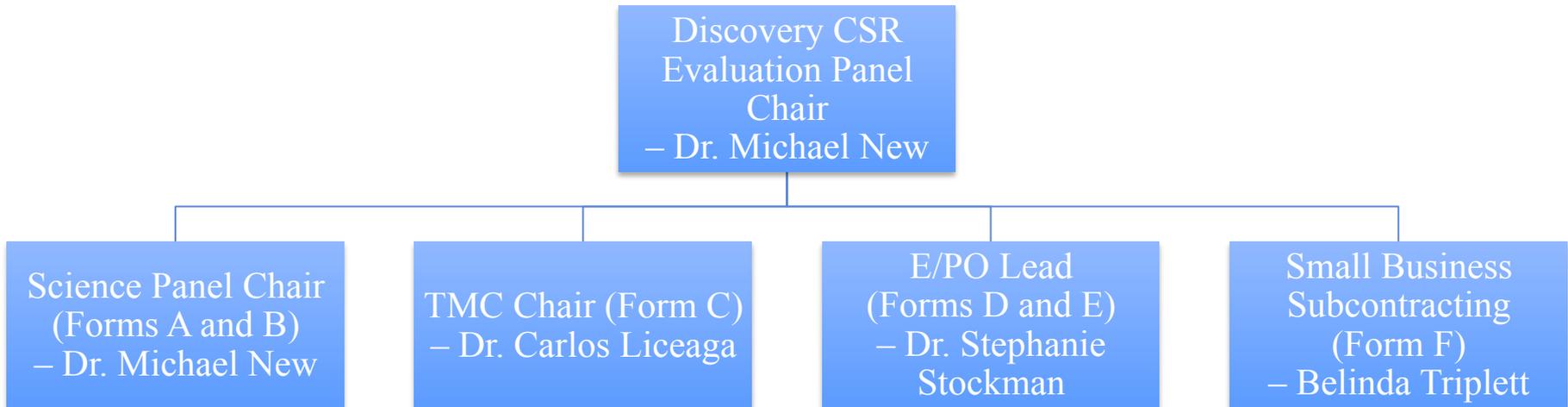


Final Plenary Products

- Finalize all evaluation Forms based on the information and clarifications provided at the site visit and the information in the CSRs.
- Both Major and Minor, Strengths and Weakness will be considered in the Grade for all Forms.
 - Form B
 - Polling will be held twice on the Form B grade. The final polling is recorded. For the final polling, the individual grades are recorded and the median grade is calculated and recorded as the final polling.
 - Form C
 - Form C will be reviewed three times. Polling will be held twice on the Form C risk rating. The final polling is recorded. For the final polling, the individual grades are recorded, the median calculated and the final grade recorded which reflects the Form C Risk rating of the median of the polling.
 - If there is a divergence of opinion, there may be additional rounds of discussion and polling.
 - Form D
 - E/PO review results are updated based on the site visit and documented in Form D.
 - Form E Student Collaboration (if necessary)
 - Representatives from the E/PO panel will consider the Merit of any proposed Student Collaboration.
 - Form F Small Business Subcontracting
 - MSFC Procurement will evaluate this factor



Organization





Observers and Transition Briefing

- The SMD AAA, Dr. Colleen Hartman, may invite Civil Servants and Contractors with downstream implementation responsibilities to participate as observers to panel meetings and site visits.
 - Observers must comply with SMD Policy Document SPD-17, *Statement of Policy on Observers at Panel Reviews of Proposals*. This policy will be provided to all approved observers.
- After selection is announced, a Transition Briefing will be provided by the Evaluation Team to Civil Servants in the Program Office and at Headquarters who have implementation responsibilities.



Observers

– Current Status on Invited Observers:

- Cassie Conley and Rakesh Mogul, Planetary Protection Office, HQ. They are invited due to their positions in which they will oversee implementation of the selected mission. Their participation as observers will provide early knowledge of any potential implementation challenges for the selected mission.
- Voleak Roeum and Gary Rawitscher from SMD, and Robert Kellogg and Kristina Kipp from Aerospace. They are invited due to their positions developing Range of Cost and Schedule estimates for later Key Decision Points of the selected mission.
- Cindy Daniels, Director, SOMA. Ms. Daniels is invited due to her position and membership in the Discover 2010 CSR Steering Committee. Ms. Daniels will act as the Backup Acquisition Manager if the Lead Acquisition Manager is not available for some meeting.
- SOMA Acquisition Managers and Program Analysts are invited to the kick-off and the plenaries so they can implement lessons learned in upcoming SMD evaluations.
- Brian Key and Bill Kahle from MSFC, Discovery Program Office. They are invited due to their positions in the Discovery Program Office which will oversee implementation of the selected mission. Mr. Key's and Mr. Kahle's participation as observers will provide early knowledge to the Program Office of any potential implementation challenges for the selected mission.
- Mark Barrera, Robert Oberto, Chris Ranieri and Mike Rokey from Aerospace, and David Ercegovic from Alphaport. They are invited due their positions performing an ASRG Gap Analysis evaluating the effects of changes in the ASRG design since it was last communicated to the CSR teams on December 1, 2011.
- The Program Manager for the Evaluations, Assessments, Studies, Services, and Support (EASSS) contract is invited to the plenaries so he can implement lessons learned in upcoming SMD evaluations.



Updates

- This page will be used to document any updates to the evaluation plan that are made after the initial concurrence.
- Changes made during the Initial Plenary
 - On page 53, the limit for briefings at each Site Visit has been increased from 7 to 8 hours.
 - On page 40, the likelihood and cost impact statements were revised, and definitions for *cost impact* and *likelihood* were added as shown on page 59.



Likelihood and Cost Impact Statements

- The *likelihood* and *cost impact*, if any, of each weakness is stated as “This finding represents a cost threat assessed to have a Very Low/Low/Moderate/High/Very High likelihood of a Minimal/Small/Moderate/Significant/Very Significant cost impact being realized during development/operations.”
- The *cost impact* is the current best estimate of the cost to mitigate the realized threat.
- The *likelihood* is the probability that the cost impact will materialize.
- The Cost Threat Matrix below defines the adjectives used to describe the likelihood and cost impact.

	Impact				
Percent of \$425M	2.35-7.06%	7.29-11.76%	12-16.47%	16.71-21.18%	21.41-25%
Likelihood	Minimal (\$10-30M)	Small (\$31-50M)	Moderate (\$51-70M)	Significant (\$71-90M)	Very Significant (≥\$91M)
Very High (≥ 90%)					
High (70-90%)					
Moderate (50-70%)					
Low (30-50%)					
Very Low (10-30%)					